

Mapping the Safety of Navigation in UK Waters

Andrew Rawson FRGS

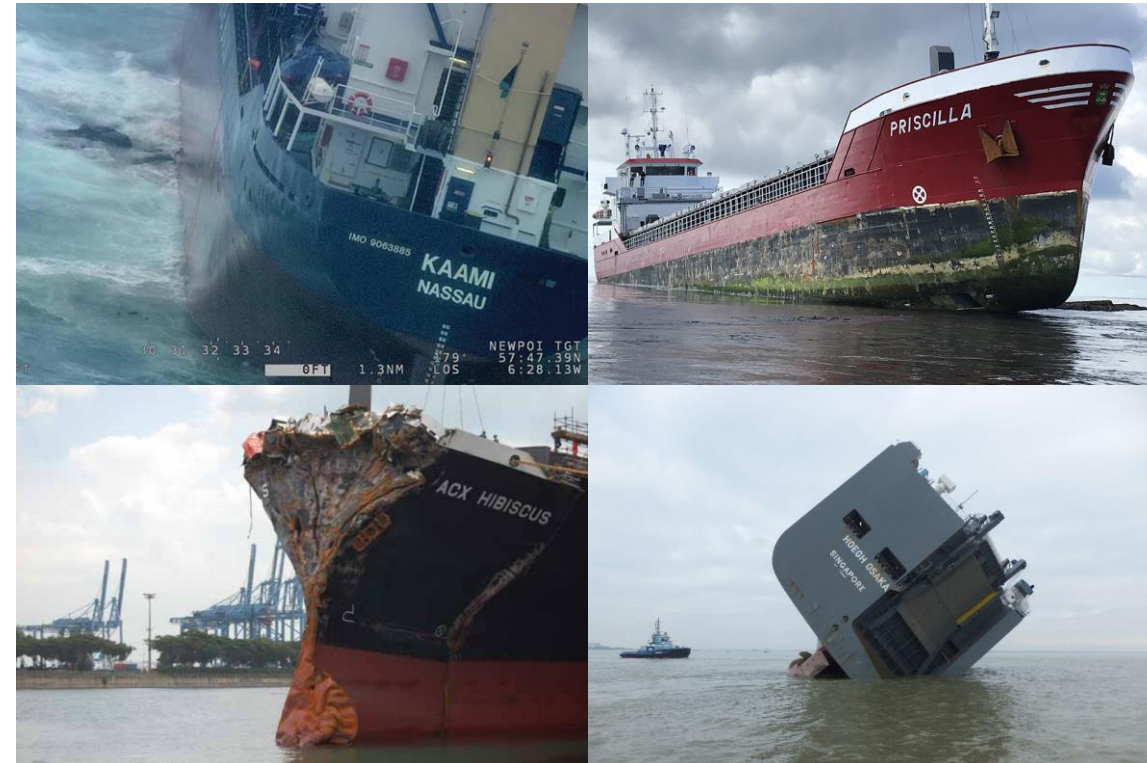
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Introduction and Overview

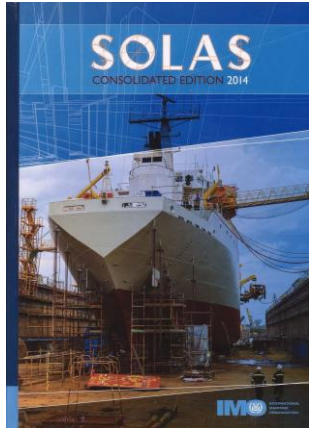
- Maritime accidents result in significant loss of life, pollution and economic damage.
- Incidents are not random - numerous works attempting to predict risk.
- Valuable intelligence gained through analysing where and why these incidents occur.
- This presentation furthers these goals using the case study of the UK.



Source: MAIB

Impact of Spatial Maritime Risk Analysis

1. Requirement under International Conventions.
2. Useful for driving policy (e.g. Offshore Wind Farms).
3. Enables more effective allocation of risk control measures.



Methodology



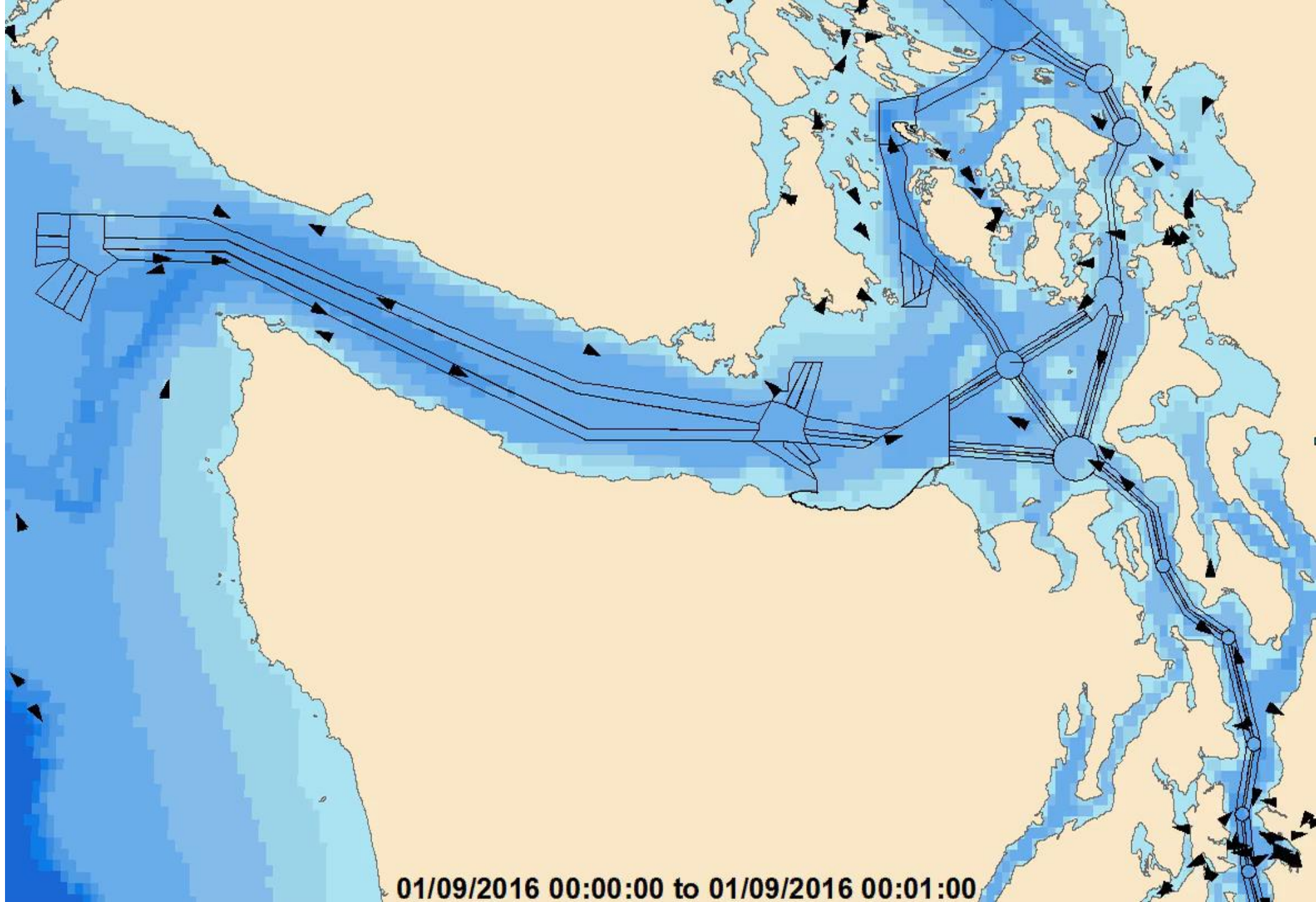
Data Collation

Data Fusion
w/DGGS

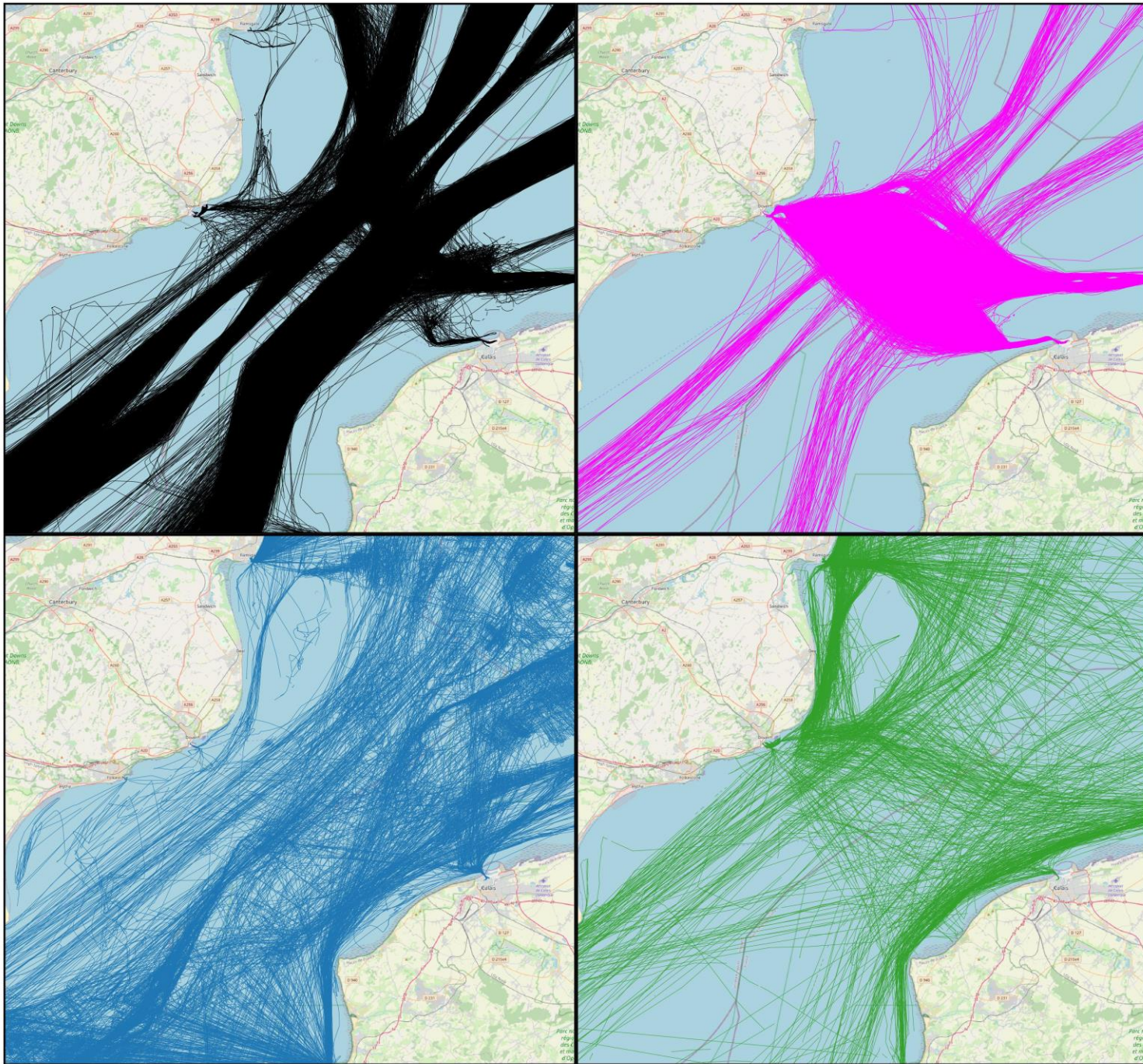
Calculate
Accident Rates

Statistical
Analysis

Discussion



01/09/2016 00:00:00 to 01/09/2016 00:01:00

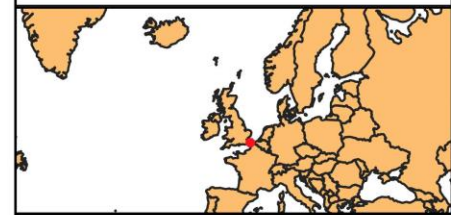


Vessel Tracks (Dover Straits).

Legend

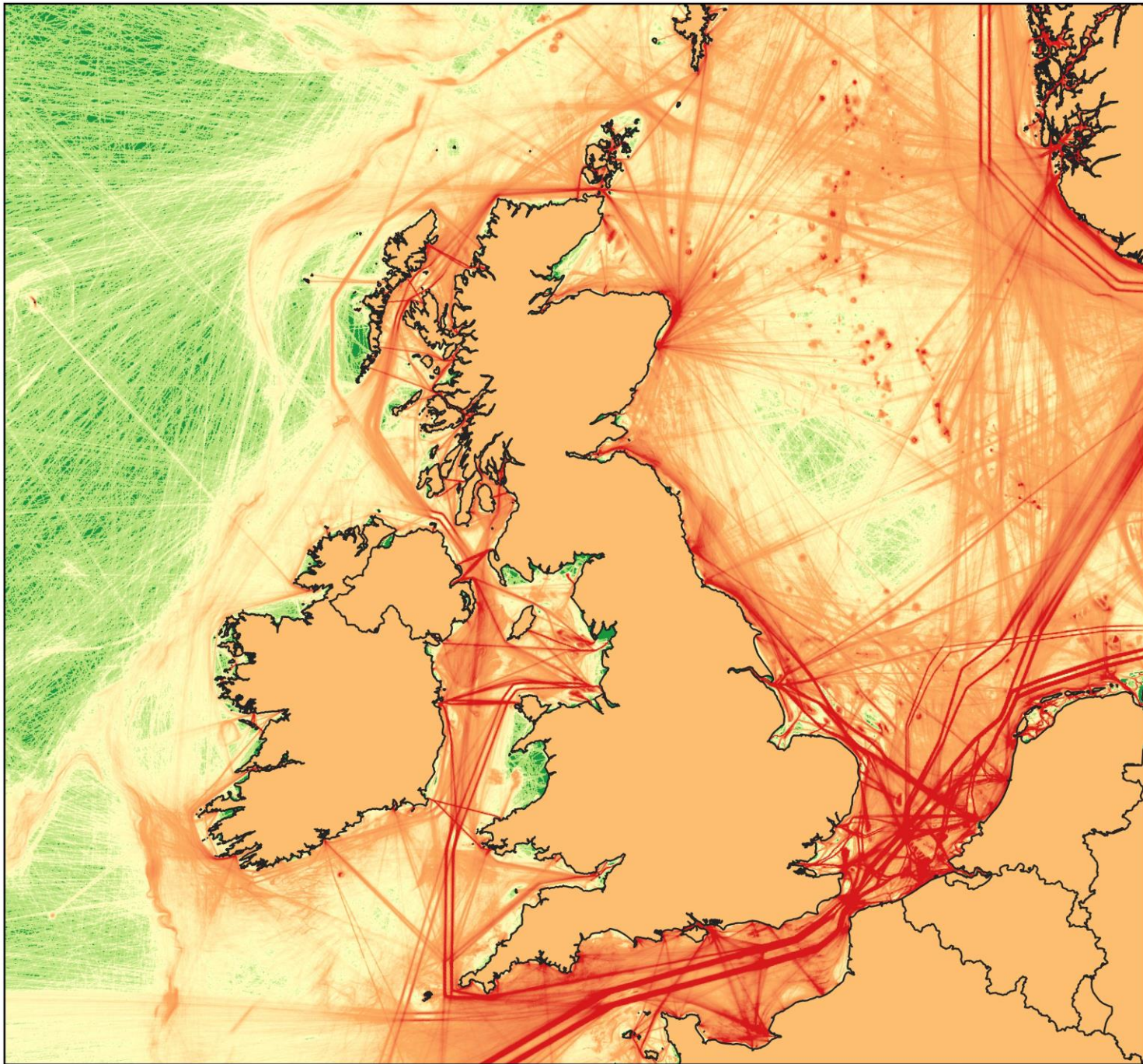
- Commercial Shipping
- Fishing Vessels
- Passenger
- Recreational

Data Sources:
AIS Data from MMO



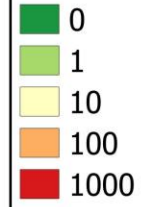
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Created by: AR Date: 2/8/2021
Ref: AR_RGS_Tracks_v1_20210802



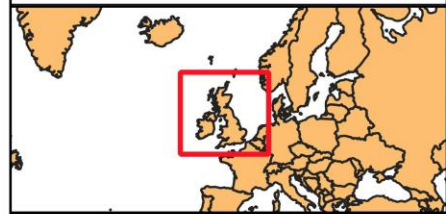


Vessel Traffic Density

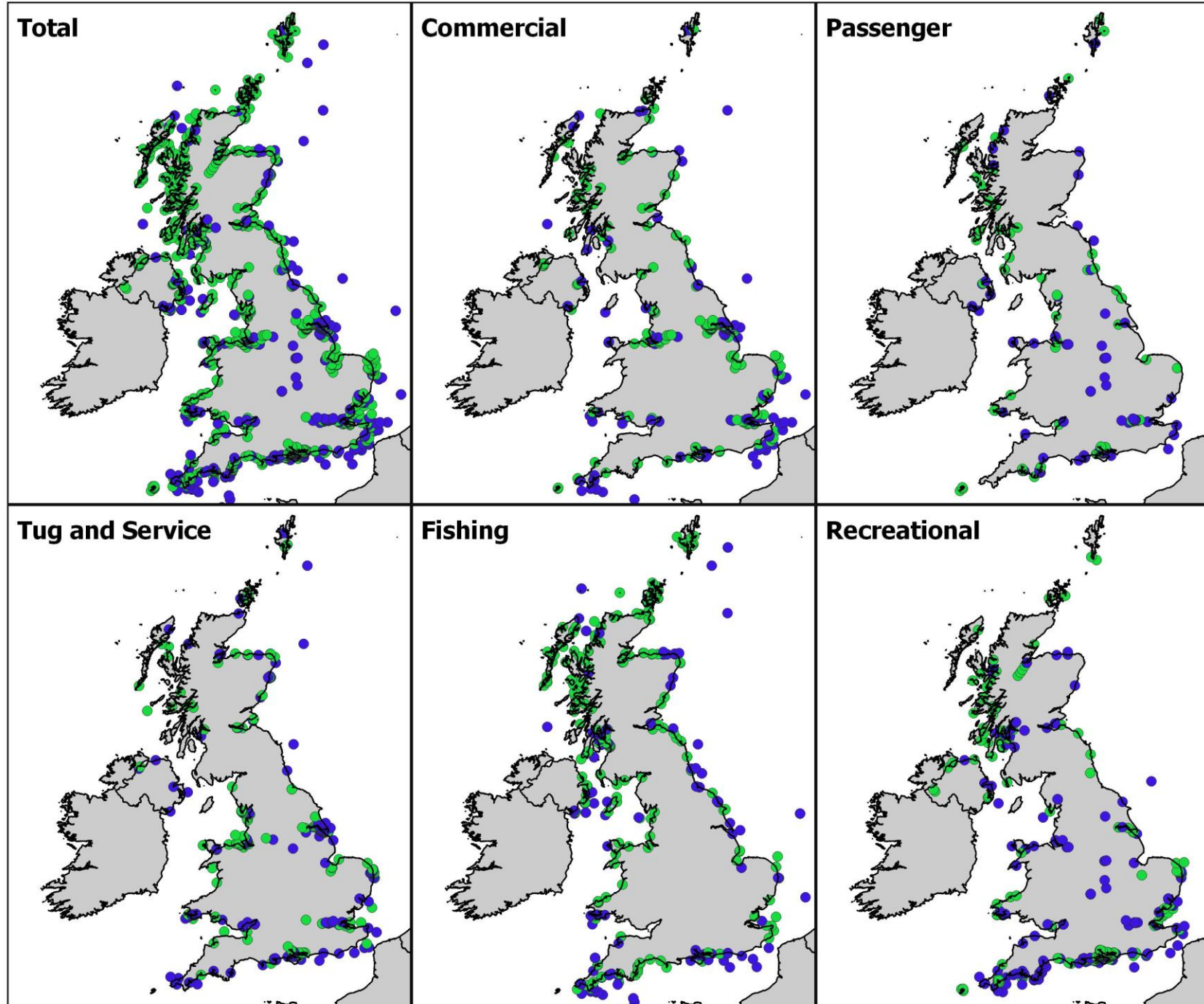
Legend



Data Sources:
EMODNet 2019



Coordinate System: ESRI:54004
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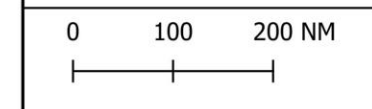


Accidents by Vessel Type (2010-2020).

Accident Type

- Collision ●
- Grounding ●

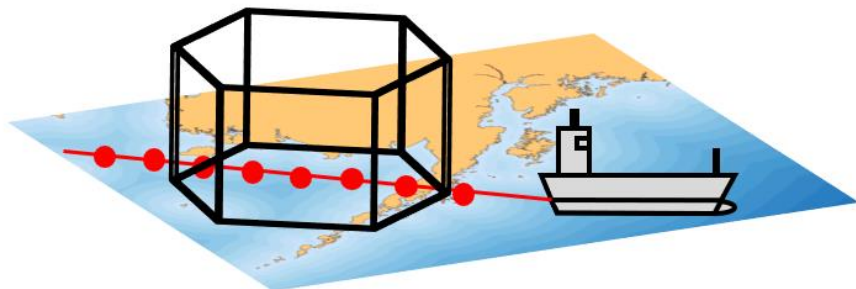
Notes:
Accident Data provided by MAIB for 2010-2020.
Refer to full paper for other data sources.



Discrete Global Grid System

DGGS:

- Equal Area Hexagonal Global Grid System promoted by the OGC*.
- Enables efficient and scalable fusion of multiple datasets.



Multiple Heterogenous Datasets:

AIS Data

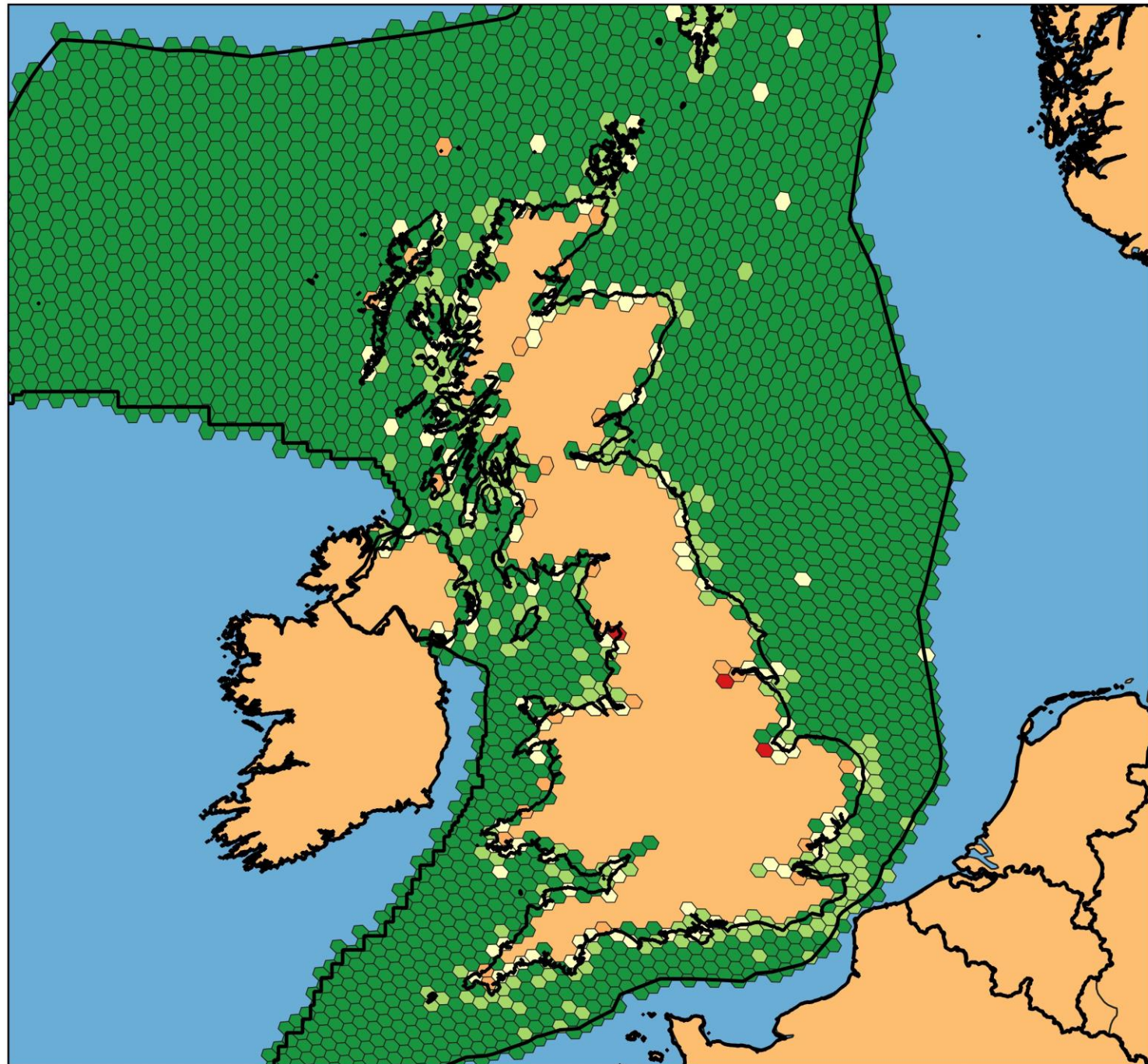
Incident

MetOcean

Topographic

Bathymetric

Infrastructure

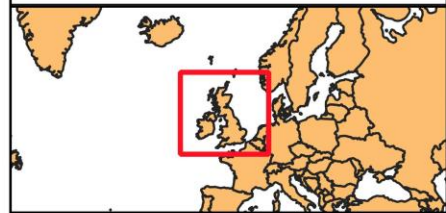


Combined Accident Rates.

Accident Rate/Movement

- 0 - 0
- 0 - 0.0001
- 0.0001 - 0.001
- 0.001 - 0.01
- 0.01 - 1

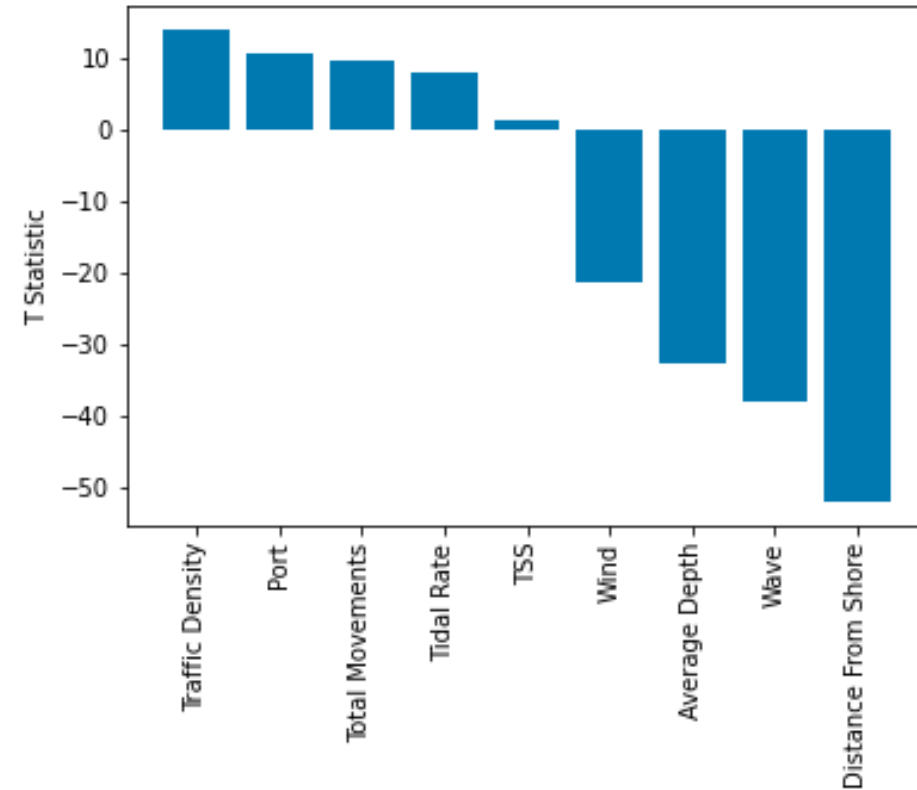
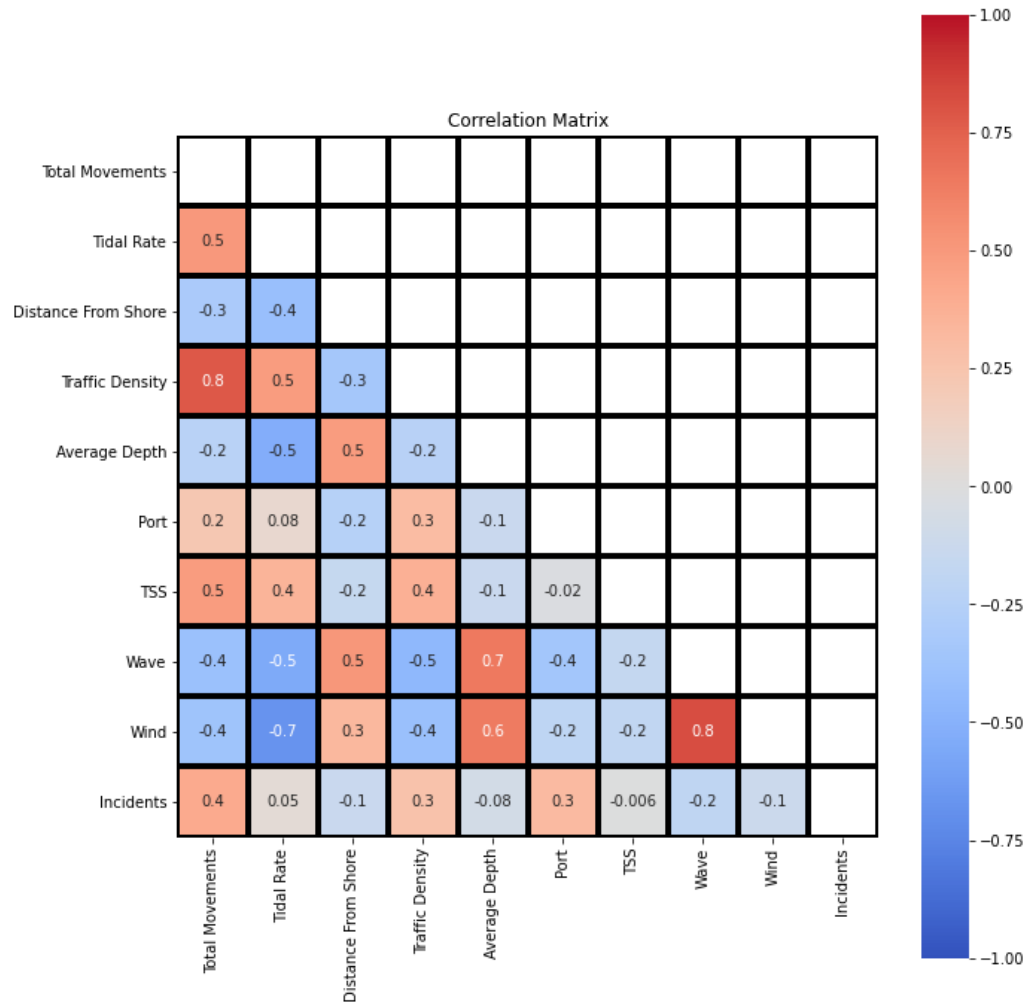
Data Sources:
AIS Data from MMO
Accident Data from MAIB



Coordinate System: ESRI:54004
Created by: AR Date: 16/8/2021
Ref: AR_RGS_IncRates_v1_20210802




Statistical Analysis of Each Cell



Summary

- Significant variation in maritime accident rates across UK waters.
- By combining multiple heterogenous spatial datasets, insights into the variation in maritime risk can be derived.
- The method and results can support navigation authorities in better managing waterways and promote safety at sea.



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